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JOHANNESBURG

The prospects of the Rio de Janeiro Summit in 1991 did not become a reality. On the contrary, sustainability seems to be farther away than before and on the issues of climate and world economy we live much closer to confrontation. The task of Johannesburg does not differ from the task of Rio, but it will be exceedingly heavier.

For the preparation of the coming World Summit for Sustainable Development, INES wrote a document, a compilation of burning issues and proposals for the solution of problems. The document, printed in this Newsletter, covers protection of the environment and climate control, agricultural and industrial production, social and economic sustainability, equity and peace. Moreover, it addresses the role of science, engineering and education which is INES' central theme. We hope that the Johannesburg Summit will deal with this wide spectrum of issues and will prepare policies in all fields of development.

Especially for the countries in the South, the most important issues are the social and economic ones, with poverty in the center. But all issues are interconnected and we do not believe that we can single out one of them, reduce the width of the

described spectrum and limit our discussion to poverty eradication alone.

If the pessimistic predictions of the climate change come true, large areas of agricultural land will be converted into deserts which will lead to an immense increase of poverty, migration and subsequent overpopulation and ethnic conflicts in other parts of the world. And if we cannot assure peace, our infrastructure will be periodically destroyed and victims of the war will be doomed to poverty. It must be stressed that establishment of peace is an essential precondition for sustainability and that only a sustainable world can be peaceful. Both the Rio documents and the Johannesburg program underestimate this interconnection and the necessity of establishing a culture of peace.

We are happy to publish in this Newsletter a paper of Dr Ngubane, Minister of Arts, Culture, Science and Technology of the Republic of South Africa, the host country of the Summit. Speaking from a Southern country, he addresses science and technology and appeals to the need of collaboration between the North and the South to improve the situation in the development countries. INES will make an effort to comply with this appeal by offering its expertise to future projects.

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WORLD SUMMIT 2002 JOHANNESBURG

To participate in the preparation and the evaluation of the World Summit in Johannesburg in 2002, INES presents proposals for a Summit agreement about:

1. Science and technology;
2. Environmental sustainability / Climate change;
3. Social sustainability;
4. Peace and sustainability;
5. The challenges for humanity / Beyond Rio

INTRODUCTION

The proposals are based partly on Agenda 21 concerns that have not been fulfilled 10 years after UNCED, partly on concerns that have arisen since 1992. The implementation of the principles of Agenda 21 which have been neglected up till now, must be a major effort for the future. We do not believe a new discussion about definitions and the pros and cons of sustainability would be useful, but intend to point out which demands have to be made at the start of the new millennium. From our point of view, particular importance must be given to overcome the ideological, economic, and institutional obstacles that have hindered the realisation of fundamental results of Rio from 1992 up to now.

Our point of departure is the basic ethical demand for social justice, environmental stewardship, economic fairness and for the accountability and responsibility of decision makers. Together these principles define an operational framework for sustainability, resulting in social minimum requirements as well as environmental limits to economic activities and a call for participatory democracy and gender equity. **Social justice, economic fairness and a healthy environment are fundamental to achieving peace and stability.** Since the Rio Summit in 1992 much of the hope for a determined policy taking the common but differentiated responsibility for the Earth's future seriously has faded away. The overall

thrust of our economic systems, social structures and science and technology is working against sustainability. Neoliberal globalisation as an economic framework giving absolute priority to free trade has taken over the policy agenda of national governments and betrayed sustainability. Instead of reaping the "peace dividend" for the benefit of mankind, many of the problems already identified 10 years ago have got worse and the hope for progress in sustainable development has been limited. A number of challenges neglected 10 years ago have remained virulent or increased in intensity (e.g. armed conflicts and some of the effects of globalisation), while others emerged only more recently (e.g. the digital divide or the need to radically reconsider the way the global financial markets are regulated). The Earth Summit in 2002 must achieve commitment by all the parties to addressing the major problems facing mankind or it will miss what may be the last opportunity to make use of a historic window of opportunity, to turn the tide on social and environmental challenges. Otherwise the huge range of existing problems are likely to develop into a global crisis.

1. SCIENCE AND TECHNOLOGY

Sustainability problems are essentially political problems. Science can provide much of the necessary information for decision making and technological innovation. Technology

can offer major improvements, e.g. in alternative energy sources, resource use efficiency (thus reducing mining) or new concepts for mobility reducing transport volumes. However, science and technology alone, without the political will, cannot effect the necessary changes in the current patterns of production and consumption, particularly in the North. Nor can technology transfer and diffusion, as highlighted in Rio, eliminate the need for changing consumption patterns of the rich elites which are seen as role models, and provide the pertinent solutions to many local problems of the South.

Science and technology can be used for opposing and contradictory forces in society and is subject to social, economic and political pressures. It will only contribute to the benefit of mankind in an institutional framework (including legal provisions, funding priorities, people's preferences and the economic system) which is oriented towards sustainable development.

The chapters in Agenda 21, dealing with science and engineering present clear principles and concepts for the structure of science and engineering and the duties of scientists and engineers to reach sustainable development. They contain instructions for the national governments to implement this structure, very little of which has been followed up in the last ten years.

Scientific research on issues vital to sustainability must be open. The social framework should allow and oblige

scientists to present their results irrespective of possible disagreement with established interests. In order to protect society and the environment, scientists, engineers and other members of society must have the duty to make potential dangers or violation of established rules known to the authorities and the public.

Education in matters of sustainability and environmental protection at all educational levels is vital in achieving a real understanding of the issues facing the World and in generating commitment and ability among people to resolving these issues. The participation of organised civil society and NGOs in sustainable development is essential.

Scientists should participate in the development of industrial and economic products and procedures, beginning in the design phase, in order to prevent products and methods from coming into existence that are a risk for society and environment. Assessment should be made in fair balance between wisdom and precaution.

The scientific community ideally is based on global co-operation, and this global partnership must be put to work for the sake of sustainable development. Research and its application must be carried out with due respect for the local knowledge base of the different cultures around the World and for the natural resources that have been vital for the development of these cultures. The skills and knowledge of people in the South regarding ways of living which are well adapted to their environment are frequently better than those prevalent in the North and should be recognised by the scientific community.

The specific problems of developing countries should be recognised since undue exploitation of resources (e.g. in Latin America and Africa) or lack of water (e.g. in Africa, the Middle East or South Asia) may lead to severe conflicts in the near future. Developing countries must not be burdened with problems largely generated by rich countries (e.g. in unfair greenhouse gas emissions trading regimes, dumping of dangerous waste and by neglecting the ecological debt of the North).

In Johannesburg, governments should pledge to prioritise

- ◆ The development and transfer of technologies enhancing the efficiency of resource use and minimising other environmental impacts, especially those that can reduce greenhouse gas emissions;
- ◆ providing funding not only for this research and technology development and transfer, but as well support new technologies overcoming market entry barriers;
- ◆ research into institutional, social and technical innovations needed to adapt to the already inevitable level of climate change;
- ◆ developing methods of food production which are suitable in environments affected by climate change should be funded under the UNFCCC;
- ◆ promoting the research for developing or further developing industrial and agricultural production methods that make optimal use of the local resources and serve the local needs for the various ethnic and environmental regions of the world;
- ◆ establishing legal protection of whistleblowers and the guarantee for freedom of speech, once deviations from the sustainability policy have been reported;
- ◆ promoting the education in sustainability matters at all educational levels, including the training and retraining of engineers and specialists.

Resources are required to bring technologies for renewable energy and resource efficiency to a stage of economic exploitation. In some cases underwriting a market for large-scale production of products (e.g. photovoltaic cells) could bring the price down significantly, allowing their widespread use in both developed and developing countries.

Direct foreign investment should be obliged by international agreement to meet the latest technology standards

regarding resource efficiency in energy and material consumption and land use.

Cultures and lifestyles achieving a decent standard of living, in particular based on a high level of social interactions at low resource consumption levels provide inspiring examples of social and technical innovations to learn from. This requires new systems of knowledge exchange, including South-North know-how transfer.

Re-focussing of bioscience funding is necessary to serve sustainable development:

- ◆ Medical science should be developed in order to meet the threat of newly emerging diseases like AIDS and the return of old diseases such as tuberculosis and malaria that are becoming resistant to present treatments. Sanitary conditions should be greatly improved as part of social sustainability, and medication should be made available to poorer countries at affordable prices.
- ◆ It is important to improve, promote and spread appropriate agricultural methods, in particular where introduction of industrialised methods of farming have lead to health disasters, destruction of natural biodiversity and traditional sustainable agricultural practices and the impoverishment of rural populations.
- ◆ The manipulation of human, animal and plant DNA must be treated with the greatest caution. Such developments are irreversible, and scientific methods may fail to predict all the consequences and side effects. The patenting of life forms and the privatisation of the knowledge of indigenous people must be prevented.
- ◆ The spectrum of economic schools of thought to be heard in decision making processes and being taught in schools and universities must be widened.

Neo-classical economics, for all its merits, is unable to grasp important

aspects of sustainable development. In many instances, it is more a part of the problem than of the solution. Other economic schools of thought provide insights that are essential for any policy towards sustainability and these should be properly valued. An important resource scarcity of the future could be the brainpower of heterodox economists.

2. ENVIRONMENTAL SUSTAINABILITY / CLIMATE CHANGE

Probably the most important environmental concern is climate change, in that if unchecked, it could lead to irreversible damage to global life support systems. Although there remains some uncertainty in the extent of climate change that may result from any particular level of emissions over a given time scale, the overwhelming evidence is that man-made emissions are having an effect on climate, and the uncertainties are not a reason for delaying action. Reversing current trends requires a major reduction in the dependence of the world's economic system on fossil fuels. Any framework for limiting greenhouse gas emissions must be equitable between countries. A principle of "Contract and Converge" should operate where the per-capita emissions of all countries converge to a level which would give total global emissions that would avoid a significant risk of catastrophic climate change. Any flexibility mechanisms or emissions trading should operate within such a framework. The effects of climate change in rising sea levels, loss of fresh water supplies and desertification could lead to conflicts over diminishing resources. Increasingly intense storms, rising sea levels, floods and droughts are likely to impact most on poorer countries (particularly in the tropics) and poorer people, while the greatest emissions come from the industrialised countries. This represents a debt which should be recognised in supporting development in poorer countries.

In Johannesburg, governments should

- ◆ pledge to develop and implement effective climate policies on the national scale,
- ◆ agree to work towards a regime for limiting greenhouse gas emissions where the global total of emissions limits the risk of irreversible consequences and which recognises the equal right of every person to share the atmosphere's carrying capacity,
- ◆ commit to enforcing laws preventing illegal logging and timber importing countries should refuse to import hardwoods from non-sustainable sources,
- ◆ establish an International Sustainable Energy Agency (ISEA),

by promoting international cooperation based on the common but different responsibilities. Absence of participation by some governments in the international framework of agreed greenhouse gas reductions must not be used as a reason to further delay the necessary structural change in all economic sectors. In particular, international aviation is currently not included in the UN framework convention on climate change. Because of the rapid growth in this sector and the particular problems of emission at high altitudes, it is essential that this be addressed.

Governments should agree to cooperate in strengthening the regimes for prevention of desertification, the protection of biodiversity (including the prevention of bio-piracy), for controlling environmentally harmful operation by TNCs (often where there is limited national influence on their operations e.g. in mining), and toxic waste shipments to the South.

The protection of existing forests (particularly in the tropics) and the expansion of forest where this is done in a way which enhances biodiversity should be priorities.

3. SOCIAL SUSTAINABILITY

Poverty alleviation and reducing income disparities in and between countries had been identified as a key

sustainability challenge already in Rio. Nonetheless, the situation has got worse over the last 10 years and urgent action is required on this, if the commitment to sustainable development is to maintain any credibility. Economic, social and cultural rights need to be emphasised as a cornerstone of sustainable development.

Other aspects of social sustainability need to be emphasised, such as:

- ◆ Providing equal opportunities to education, career and a self determined lifestyle without discrimination by sex, race, religion and so forth;
- ◆ strengthening human rights;
- ◆ promoting transparency of decisions and the accountability of decision makers;
- ◆ safeguarding an effective and efficient public sector in particular for health, education and public transport. The GATS negotiations must not undermine the existence of public services;
- ◆ appropriate health protection in the workplace and in the society as a whole;
- ◆ building workplace democracy.

In Johannesburg, governments should pledge and agree...

- ◆ To reducing poverty, inequity, unemployment and social exclusion;
- ◆ that WTO rules must not allow a drive for unrestricted free trade to over-rule justifiable environmental controls, social, employment and local skills and capacity building policies; to set up environmental and social rights frameworks for all free trade areas established or under preparation, as well as for the World economy as a whole;
- ◆ to scrutinise the existing governance structure as to its impact on gender equity and to reform it accordingly;
- ◆ to strengthen the compliance with codified human rights norms, including the social rights;

- ◆ to start developing a mechanism to tax the speculative money flows and use the revenues for financing sustainable development in particular in the poorest countries;
- ◆ to start developing a mechanism to tax information flows earmarking the revenues for bridging the digital divide competence building and hardware provision.

4. PEACE AND SUSTAINABILITY

Sustainability is unthinkable without peace. Peace is a prerequisite and component of sustainable development, and for a sustainable society that solves fundamental global social and ecological problems and strives for worldwide justice, peace is more than the absence of structural force. In the Rio documents of 1992 this principle is acknowledged at various places, but no mention is made of the terrible consequences of war and no tools are recommended for the banning of war and the establishment of peace. In particular, the problem circle: *peace–disarmament–conflict prevention* has not been under discussion.

Therefore a passage about peace and sustainability should be included in the documents of Johannesburg both in the governmental documents and in the documents of the NGO's.

A Sustainable Society requires Peace.

Peace requires Sustainable Development.

When aiming for conflict prevention and peaceful solutions, we again have to put emphasis on disarmament.

Armament already kills in times of peace. The huge sums spent on armaments (in 2000 approx. 750 billions US\$) divert resources away from solving many of the worlds real problems, intensify poverty and lead to further restrictions of social welfare benefits. Peaceful conflict

Rio Declaration on Environment and Development

The United Nations Conference on Environment and Development

Having met at Rio de Janeiro from 3rd to 14th June 1992, **Reaffirming** the Declaration of the United Nations Conference on the Human Environment, adopted at Stockholm on 16th June 1972 and seeking to build upon it,

With the goal of establishing a new and equitable global partnership through the creation of new levels of cooperation among states, key sectors of societies and people,

Working towards international agreements which respect the interests of all and protect the integrity of the global environmental and developmental system,

Recognizing the integral and interdependent nature of the Earth, our home,

Proclaims that:

Principle 25

Peace, development and environmental protection are interdependent and indivisible.

resolution and proactive policies based on democracy and equity must take the place of military intervention and armed internal conflicts.

Weapons of mass destruction (above all, nuclear weapons), in addition to the risk to humanity, also pose major risks to the biosphere. Treaties for the reduction and elimination of such weapons are in a serious crisis. The military use of space must be prevented as it can lead to the destruction of the arms control systems built up painstakingly over decades.

Armament kills daily in the 49 wars taking place in 2001, by the worldwide export of armaments, by mines and small arms. Military interventions aggravate the already violent situations in regional conflicts and civil wars.

Lasting peace is secured by the promotion of sustainable development rather than the development of ever more sophisticated weapons systems and is basic to achieving long term stability and security of individuals and nations.

The abominable international violence of 11th September 2001 gives a new dimension to terrorism and warfare that in the age of globalization reaches all of us. It makes new demands on politics and societies worldwide, to take on new responsibilities, combining common sense, ethical principles and special expertise, in order to find answers to the questions of conflict and crisis.

A solution of the problems will only be achieved if the roots of war and terrorism are attacked. These include:

- worldwide power and prosperity differences:
- cultural and religious differences; and
- the growing readiness of many persons to put their own lives into the service of terrorist organizations.

The formulation of an effective international response to terrorism that takes into account the policies that lead to hatred will be essential to achieving peace in the world.

In Johannesburg, governments should:

- include the issues of conflict prevention and resolution, peace and disarmament in the future sustainability agenda;
- develop more effective and adequately resourced UN systems for conflict prevention, humanitarian intervention and peace-making;
- pledge to divert a significant proportion of the large R&D effort **and financial and other resources** devoted to military purposes of researching, developing and implementing measures aimed at achieving sustainable development;

and agree to:

- a 10 year plan to decrease armament expenditures in every country by at least 5% each year, and provide the financial means for peace policy, the support of the developing countries and of worldwide sustainability projects;
- use this process to scale down the weapons industry and support the conversion to non-military products;
- a global ban or strict controls on the export of armaments to be signed by the industrialized countries by the year 2005;
- strengthen the international regimes for conflict prevention by signing and ratifying without further delay, irrespective of some governments not yet participating:
 - the convention on small arms trade,
 - the biological weapons verification protocol,
 - the convention on the international criminal court,
 - a convention for the abolition of nuclear weapons,
 - an extended ban on the production of and trade in land mines,

- a recommitment to the 1967 „Outer Space Treaty,” and a new treaty banning the weaponization of space.

5. THE CHALLENGES FOR HUMANITY / BEYOND RIO

Global governance is not something to be called for, it is a tangible fact of life. However, so far the framework for governance is not there for humanity as a whole, but has been dominated by corporate interests: WTO, IMF and the World Bank dominate global governance and must assume their share of responsibility for growing inequality and misery, whereas UNEP, CSD and ILO do not carry any comparable weight. Thus the international regimes are dominated by business interests, most notably by large multinationals and investment funds, not by workers, consumers and other citizens. On the national level these big players have the power to determine governments' tax and social policies, by pressure (in particular given the enduring debt crisis through Structural Adjustment Programmes) or by corruption. Global organisations are in urgent need of more transparency and participation opportunities for civil society representatives including trade unions and NGOs. These considerations also apply to the business sector as a whole. Whereas workers' participation can be a driving force for improved working and health conditions, it can also be a source of innovations towards a more sustainable corporate performance.

For a sustainable future, ethical values must be implemented into the global governance architecture, securing the respect for human and labour rights, empowerment of women, social and environmental minimum standards. For this behalf, the international trade regime must be made compatible with and supportive to environmental agreements and social standards including labour rights. In the human-

focussed economy of a sustainable future World, international solidarity must prevail over global profits.

The ethical principle of equity is even more demanding: it calls for equitable sharing the Earth's richness, the common heritage of mankind. Markets can guarantee allocative efficiency, but neither social justice nor precautionary environmental policy or gender equity. As the market alone will not deliver social, environmental and gender justice, all markets are in urgent need of a political framework like the ones they have on the national level. Consequently, any agreement on free trade area must go together with the establishment of proper participatory social and environmental regulatory frameworks on the same level of decision-making, or it should not go on at all. Social standards, environmental regulations and equity policies plus more democracy inside and outside the corporate sector are essential precondition if a regional market is to become a force for sustainable development.

Technology and legislation alone will not solve the problems facing the World. Changes in lifestyle, consumption and production patterns will be needed, especially in the richer countries, with recognition that quality of life is not identical to GDP per head. Demonstration by rich countries in the North and elites in the South that a good quality of life is possible without high levels of resource consumption is needed to gain general acceptance of an economic and lifestyle model compatible with sustainable development. Given a suitable framework, we believe that a good quality of life for all people is possible. In this process, globalisation must be hindered to press for uniformity; a sustainable World will celebrate human, linguistic and cultural diversity, providing opportunities to further develop these assets. No market will deliver this issue; it will need committed politics to come to life.

The challenges are huge, but people can grow and be fulfilled when faced by challenges.

A SIGNAL FROM SOUTH AFRICA

Address of Dr Ben Ngubane at the occasion of the third conference of the European Coalition for Rio+10, Brussels, 20 – 21 June 2002

Dr Ngubane is Minister of Arts, Culture, Science and Technology of the Republic of South Africa; he is the Chairperson of the Commonwealth Science Council.

The Chairperson Mrs. Ilona Graenitz, Lord Holme of Cheltenham, Mr. Derek Osborne, Mr. Raymond Van Ermen and distinguished delegates. I am deeply honored by the opportunity afforded to me to make a contribution to the European Rio +10 Coalition's preparations for the World Summit on Sustainable Development. South Africa is privileged to host this event that will be held in Johannesburg at the end of August this year.

The fourth preparatory committee meeting was held in Bali at the end of May, as I am sure many of you are aware. The World Summit on Sustainable Development faces the considerable challenge of carrying forward Agenda 21, as well as strengthening global action to address poverty in response to the deeper understanding that has emerged of the importance of sustainable development.

Sustainable development is considered to be based on a proper balance and dynamic between economic, social and environmental imperatives. Over-emphasis of one dimension at the expense of another ultimately leads to potential failure of the system as a whole. In the 10 years since Rio, the world has changed dramatically. The rapid advance of globalization, the widening gap between rich and poor, and the ongoing concern about the sustainability of our current patterns of consumption, have characterized this period.

It was to be hoped therefore, that a new high-level consensus would emerge about the challenges that face us. The process of negotiation however, has been slow. As new insights and

issues have come to the fore, they have not been taken up in a positive and effective way. There is a risk therefore, that the World Summit on Sustainable Development will not deliver targeted action plans with proper resource commitments and agreed time scales. In the jargon of the WSSD, negotiated commitments have come to be called 'Type 1' outcomes. These Type 1 outcomes operate in contra-distinction to Type 2 outcomes, which are intended to be voluntary partnerships of willing participants who work together to support the broader Type 1 agreements.

However, from a developing world perspective, the insistence of some countries in the negotiations, on removing any references to resources or time-lines, will inevitably devalue Type 2 partnerships. The simple reason for this is that voluntary partnerships cannot be a substitute for multi-lateral global commitments. Therefore, it is critical to recognize that Type 2 partnerships in, and of themselves, may be very positive, but within the context of a weak negotiated text, Type 2 partnerships become potentially an insubstantial sop to the developing world.

Europe of course, should not fall into the trap of devaluing the negotiated text, for indeed, the European story has been one of co-operative development based on a shared vision of the future. The story of the European Union and the strengthening and development of real bonds between the nations, is a signal to the rest of the world, that collaboration is possible and that proactive resource allocation to weaker partners within agreed frameworks is indeed the preferred way to deal with under-development. It is my appeal therefore that all actors within the European setting seek to achieve a strong Type 1 negotiated text which will provide a positive basis for Type 2 partnerships.

Part of the difficulty faced by the developing world is the rapid convergence of economic, social and environmental issues, and this places huge burdens on countries wrestling with issues such as poverty, disease, environmental disasters and the protection of fragile young democracies.

Indeed, it is difficult to argue with the perspective of the least developed countries, that in the short-term, economic survival, and hopefully economic growth, is the most pressing challenge.

There is no doubt that such countries face challenges that could be addressed, given sufficient resources and political will. The types of issues under negotiation in the WSSD include water and sanitation, health, education, access to reliable modern energy systems, improved agricultural practices, and a more effective basis for food security. The developed world which commands the resources to address many of these issues, correctly insists on effective governance and responsible programs of action.

As the Minister responsible for science and technology in my country, I am keenly aware of the critical role that technology plays in development. Technological innovation and improvement, usually based on new knowledge, contributes more than half of the economic growth of the developed world. In the developing world, this is not the case. Labor, capital and natural resources are the prime sources of growth.

Unless there is a fundamentally changed mechanism for the developing world to use technology, and to harness it's power for economic growth, the least developed countries will in fact move backwards relative to the developed world. The process of technology transfer, as currently conceived, is simply insufficient to create the conditions for development at an accelerated pace.

Of course, this requires of the developing world that there is a greatly increased emphasis on science and technology in the economy and in the social sphere. Mathematics, science and computing should be the focus of primary and secondary schooling. Universities and research organizations in the developing world should significantly strengthen their production of engineers and scientists. In addition, we should develop stronger programs with local industry to transfer technology to small enterprises, and to support larger enterprises in the process of innovation. There is however, such a massive backlog to be dealt with in critical areas of infrastructure and social need, that such programs will only be meaningful if undertaken in partnership with the developed world.

In the area of trade there is also, as we will indicate in a later session, a need to support developing countries to ensure that new types of "invisible" trade barriers do not inhibit the ability of developing world exporters to reach markets in the developed world.

It is critical that we find positive ways to move beyond the recent setbacks evidenced by increased protection of agriculture in the developed world. As many of you will be aware, the domestic agriculture subsidies granted in Europe and the United States directly and negatively impact the ability of the developing world to trade in the domain where we have the most productive resources – that is, agriculture.

There is also the matter of the sophistication of consumers. In order for resource poor exporters to trade successfully, they need access to critical knowledge and technologies related to consumer choices and preferences. The science, technology and innovation that would support them addressing such issues are a pressing concern.

It is my hope that relatively soon multinational companies will begin to engage with developing countries to create positive and effective programs to enhance the science and technology base of the developing world. It is a sad fact that many inter-

governmental organizations and multi-lateral development agencies should be challenged to engage in the same process. Some agencies endeavour to avoid working with national governments, preferring instead to deliver solutions through NGOs and consultants. This has the effect of damaging the credibility of national governance in the eyes of the NGO sector, while at the same time creating capacities in the NGOs that rival the capacity of governments themselves to deliver. As I will indicate in my remarks on

NEPAD, country strategies and governmental ownership are crucial to sustainable development.

In considering Type 2 partnerships therefore, it is important for the participants to be aware of the needs of the developing world. Type 2 partnerships should always involve proper support from national and regional governmental structures if they are to be sustainable and credible. The private sector has a key role to play, both as a partner and as a source of expertise, but it is important to recognize that in many developing countries, large companies do not have an uncomplicated relationship with averment and communities more broadly. Corporate social responsibility must be seen in the context of the developing world and include actions to develop the knowledge infrastructure of the nations in which multinational companies engage.

However, I would not want the, perhaps, cautionary tone I have adopted to suggest that the developing world does not see any value in productive and effective partnerships. Indeed, South Africa and other developing countries have welcomed many of the initiatives that have emerged in recent years in the fields of health, water, agriculture and the like. The developing world will continue to engage in such processes, given the pressing needs and challenges that we face. As you are aware, there are now strong moves to improve integration of such efforts and to ensure that they are effective and synergistic. This implies that major donor programs should be mediated by direct budgetary support

to governments coupled with expert assistance rather than through hundreds of small projects and programs. This will lead to greater efficiency, greater delivery capacity and more strategic use of resources.

Smaller projects and programs have their place. They are normally most needed where knowledge is limited and where "piloting" and "demonstration" are the key processes of delivery. Sustainable development however must necessarily operate at the "system" level. South Africa therefore will tend to lend its support to significant Type 2 initiatives that will have a system-wide impact and to smaller ones where the process of knowledge generation / learning is crucial.

In drawing to a close, I would like to recognize the achievements of recent negotiations at Doha and Monterrey, and suggest that, if the World Summit on Sustainable Development is to be similarly successful, that the focus be on practical, well-resourced measures that would lead to the eradication of poverty and full and equal participation by the developing world in the global economy. I have indicated how important science and technology are to this process. We have welcomed the proposal by Mr. Nitin Desai, the Secretary General of WSSD, that a science forum operate as a parallel event to the WSSD. We also welcome the participation of the EU in this parallel event. It is to be hoped that we will be able to announce some significant Type 2 partnerships at that time.

I encourage all participants, to be practical, pro-poor and pro-planet in the actions you seek to take. Business should seek to act responsibly and stakeholders should seek effective solutions and partnerships. Coalitions such as the European Partners for the Environment should endeavour to incorporate the perspectives of the developing world in all programs. Indeed, if we are to succeed, representatives of the developing world should be full partners in all initiatives. I look forward to joining with you in these important discussions.

I thank you.

SUSTAINABILITY SCIENCE:

Which science and technology for sustainable development?

Joachim H. Spangenberg

Joachim Spangenberg is Vice-President of the Sustainable Europe Research Institute (SERI) at Cologne, Germany; he is a member of the Executive Committee of the International Network of Engineers and Scientists for Global Responsibility.

Sustainable Development

Research for sustainability must be clear about what sustainability is all about – otherwise, without a substantial understanding of the subject matter at stake, research would strive to answer questions which may have not been asked and which might even not make any sense in the sustainability context. So what is sustainable development?

The concept of sustainable development has emerged as a new paradigm during the last decade. The definition most frequently referred to is the one provided by the Brundtland Commission's (officially the WCED World Commission on Environment and Development), characterising it as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs" (WCED 1987, p. 43). This definition has been publicly denounced as vague, imprecise and not operational. However, it has helped to put sustainable development on the international policy agenda, making the concept a vision so impossible to ignore that all kinds of interest groups are actively battling for hegemony regarding the definition. No surprise then, that the approaches suggested lack any common definition or operational principle: a common definition of sustainable development needs to cover a broad range of interests which have no easily identifiable common denominator (Brand 2002). So it is not the

vagueness of the WCED's suggestion, but the conflicts of interest which cause the somewhat murky picture of what sustainability is all about. However, the Commission's definition already includes all key elements of sustainable development in a nutshell.

First of all, sustainable development is not a positive but a normative concept, ethical rather than analytical. It demands intergenerational justice to preserve the freedom of choice for future generations, regardless of what their attitudes and preferences might be. Secondly, it demands that the "need of the present" should be met, including all humans on Earth, and not restricting needs to economic or basic ones. Thus the Brundtland Commission's ethically based pre-analytical vision or grand narrative is to provide to everybody everywhere and at any time the opportunity to lead a dignified life in his or her respective society. This is assumed to include a decent standard of living, social cohesion, freedom in an open and participative society and a healthy environment. The three core imperatives derived from the problem areas are (Kopfmüller et al. 2001):

- ◆ the environmental imperative: safeguarding the environment,
- ◆ the social imperative: realising justice between people, countries, gender, social groups etc, and
- ◆ the institutional imperative: securing political participation.

An economic imperative is not mentioned. Instead, the economy is perceived as Ianus-headed, exhibiting deep ambiguities: it is a driving force behind most of the problems, as well as a potential force for the better, contributing to the solution of

problems by creating enough wealth to solve them. In a similar fashion, science and technology are increasingly recognised as central both to the origins of the sustainability challenges, and to the prospects of successfully dealing with them.

The Challenge to Science and Engineering

Facing the "triple P sustainability challenge" of poverty, pollution and participation deficits means that science must strive to understand both the natural and the cultural World and the way they interact in order to help find ways out of the sustainability crisis. This includes helping to map out the choices society faces and their consequences, while not confusing means and ends, i.e. being clear about the fact that the choices we face are societal choices, not scientific or technical ones.

As a normative concept including social, economic, environmental and institutional objectives (UNDP/CSO 1996, UNDSO 2000, UNECOSOC 2001) sustainable development is perhaps the most fundamental challenge to the concept and institutional system of modern science that ever emerged since the Romantic period. So far the scientific community was used to set its own agenda, irrespective of the problems concerning the society at large (except those articulated by granting public or private research funds, of course), and steadily developing into an agglomeration of more and more specialised, rather unconnected disciplines and schools of thought. At the same time, the sustainability discourse offers immense opportunities to reconnect science to society and to build a new basis of public support for research and development as a key precondition for both science and society to flourish.

The imperatives mentioned have been defined in order to generate solutions to four themes identified as key societal problems under the sustainability paradigm (WCED 1987, Kopfmüller 2001):

- the environmental challenge: the global degradation of the natural basis of human life,
- the first social challenge: the increasingly unequal distribution of income and assets in and between countries,
- the second social challenge: the high number of people living in poverty, and
- the institutional challenge: the resulting threats to peace and security.

These challenges are neither based on one core problem nor independent but interlinked. They have to be dealt with simultaneously rather than consecutively due to the very urgency of the problems. Both these facts give reason to approach sustainable development as a dynamic optimisation process across the four dimensions (social, environmental, economic and institutional) of sustainable development. Sustainability research thus has to contribute to

- the integration of economic, social, environmental and institutional research issues into a coherent framework of interacting complex systems, safeguarding the essential interests of each dimension (not necessarily each discipline), as far as possible in synergistic way to save scarce (intellectual just as financial) resources,
- the (re-)introduction of normative targets, in particular concerning distributional justice in and between countries as highly relevant research topics into economics, ecology, sociology, political sciences, trade, development and other research, and
- the extension of the research perspective to include distant regions and future generations, monitoring and assessing the

impacts of our more sophisticated, far reaching and enduring interventions into natural and social systems, in particular since in many cases our understanding of the systems affected lags behind our interventions (stop “throwing stones farther than we can look” by learning to look farther).

While the integration condition requests transdisciplinary research to identify synergies and trade offs between the systems and issues concerned, the normative target rules out all solutions involving the generation of externalities to be passed on, as the global and intergenerational perspective demands a new approach towards boundary setting in analysis and impact assessment.

Science for sustainability is science which meets these criteria while contributing to solutions for the most urgent sustainability problems as defined by society, not by science. It represents an effort to empower all members of society to make informed decisions, thus representing an idea of the “knowledge society” going far beyond technical means of communication. Sustainability science needs to include and build upon natural, technical, social and economic sciences, but has to integrate and reshape them to accommodate the needs of the sustainability paradigm.

Sustainability Science: In Search of a Shared Vision

Sustainability science supports the quest for sustainable solutions in a complex world characterised by factors which may be generated locally, but with their impacts affecting people across countries and generations. They include for instance:

- the globalisation of communication, culture, finance and economies, and the resulting dependency of states, economies, nations and cultures on factors beyond their control,
- a global environmental crisis in need of monitoring, assessment and rapid preventive and adaptive measures. Such problems

include the rapid and largely irreversible transformation of the land, the increased carbon emissions causing climate change and the long-term threat of nuclear waste from civilian and military uses, overexploitation of scarce water resources and salinisation of aquifers, or the loss of biodiversity and the risk of destabilising populations by the release of genetically modified organisms,

- the North-South divide in income, life expectation, health service provision, research capacities (resulting in a path-bound development of scientific research and technology development on mostly Northern demands) and economic, social and environmental vulnerability,
- a lack of gender balance in society as well as in science and engineering, depriving societies of a most urgently needed resource, the knowledge, experience and initiative provided by women,
- a World with an urbanisation of more than 50% by 2020, causing all kinds of local social, economic, environmental and governance problems.

Science-based interventions in complex natural and social systems can constitute, in themselves, a self-renewing source of problems. Science for sustainability needs to counteract these challenges by issue-driven and reflexive research, beyond the prevailing curiosity-generated or mission-oriented work. This includes reducing vulnerability through the implementation of early warning systems and the development of suggestions for effective prevention strategies and adaptation measures, including if necessary restrictions to the use of scientific insight and technological capabilities. It needs to support policy implementation and enforcement by developing effective monitoring mechanisms, and it should provide examples of problem solving, for instance by setting standards for gender equity, North-South co-operation and a problem-solving research focus within the scientific community.

Sustainability science cannot but be complexity science, dealing with the interaction of multiple-complex, dynamic, non-linear, self-organising systems under conditions of irreducible uncertainty (Funtowicz et al. 1998; 1999). This poses challenges for the analytical and methodological development work, including the generation of appropriate tools for theoretical model generation and empirical analysis. In order to do so, sustainability science has to explore new knowledge and effectively apply existing knowledge, although in a reflexive manner (Beck 1996, Giddens 1996) taking into account cross-system feedback loops and rebound effects, time gaps, non-linear and threshold effects, multiple system equilibria and the irreversible lack causal explanations. As the effects to be taken into account will frequently emerge outside the individual scientist's realm and field of competence, making it urgent to overcome the old-fashioned conception of scientific communication as one-way traffic of information from experts to decision makers and the public at large has to be replaced by a notion of partnership through reciprocal learning by all those involved and affected. This means a deep involvement of the public and decision makers into the quality assurance and assessment of scientific and technological innovation: every stakeholder becomes a peer (Spangenberg 2001).

As the problems analysed, science for sustainability must cross disciplinary borders. This implies not only involving different disciplines in the course of research, but going beyond specialised scholarship towards "transdisciplinary research" (Mittelstraß 1992) by involving all appropriate disciplines as well as representatives of relevant non-scientific knowledge in the definition of the problems to be analysed and the lay out of the research work to be undertaken. Integrated approaches addressing multiple goals based on *all* kinds of knowledge available are a necessity in a research field consisting of multiple interacting systems, each of them bound to certain sustainability objectives. In

this sense, sustainability science must be post-normal (Funtowicz, Ravetz 1993; Luks 1996) public science, defining research questions relevant to society and identifying solutions resonating with decision makers. The results must be reliable enough for people risking to act upon, and they must have immediate meaning to decision makers in order to be applied in practice. Science and technology are most effective when research and development are undertaken in close collaboration with stakeholders and users, in particular with decision makers in administration, politics and the business sector. This calls for an improved dialogue of science, engineering, politics and civil society, but this kind of new partnership needs to be based on new orientations towards global responsibility, not least of science and amongst scientists.

Cross Cutting Challenges

The strengthening of nations' scientific capability is an important contribution to sustainable development. However, this capacity should not just follow "the trodden path of science" but be developed with a clear emphasis on the challenge posed by sustainable development needs. The promotion of science for sustainable development thus requires procedures for evaluating science and technology contributions against criteria for sustainability. Neither the advance of science and technology itself nor the current widening of competitive markets can be expected to promote, as if 'naturally' a path of sustainable development. On the contrary, the short-term orientation and the mixtures of commercial, military and other preoccupations that motivate much of the science-based technology development are most often controversial to a sustainability perspective based on peace, justice and environmentally sound development (Funtowicz et al. 1999). There is an undeniable risk of under-supplying public goods essential to sustainable development when too much of the R&D talent is in private hands, and focused on delivering private value.

Research for sustainability has to take into account the fact that social, economic and environmental systems are dynamic and interlinked non-equilibrium systems, and to adapt basic assumptions of the research agenda accordingly. Technology development should be twinned with technology assessment, both taking into account the complex setting the artefacts they deliver will work in and the complex set of demands they will be confronted with throughout the design and development process, including not only effective functioning and economic viability but with the same importance the side effects on social and environmental systems all too often ignored and externalised. Conceptual understanding is a precondition for practical solutions, but reliable baseline data and concepts are just as important. They are the means of testing and if appropriate falsifying the concepts. The move from case studies and pilot projects to a body of comparative, critically assessed and evaluated knowledge to be expanded through the interaction of theoretical reasoning and empirical application is an essential step towards understanding the sustainability challenge. Given the global challenges, sustainability science must be global in its outreach as in its participation, including capacity building to narrow the knowledge divide.

To promote sustainability there needs to be explicit identification of the kind of future socio-economic order that societies wish to strive for, and a permanent social learning process in pursuit of these goals, involving scientists and engineers as all other members of society. To make best use of this continuous learning process, changes introduced by science and technology as well as their effects should be as far as possible reversible rather than establishing bifurcation points and initiating irreversible, path-dependant developments. An error-friendly (von Weizsäcker 1984) design and management of technical and social systems might help to safeguard the self-determination of societies in times of rapid, technology driven change. Error-friendliness combines two

characteristics: error tolerance to accommodate human mistakes, and error driven learning mechanisms as a means of permanent improvement (von Weizsäcker 1990).

If science is to contribute effectively as a force for sustainable development, clear criteria must be set and priorities developed within the scientific community and its donor groups. However, this requires changes in both demand for and supply of sustainability science. On the supply side, this involves renovations of disciplinary approaches as well as innovative research covering new ground in dealing with crosscutting issues of several systems (economic, social, institutional, and environmental). The International Council for Science (ICSU et al. 2002) has identified three core themes:

➤ *adaptiveness, vulnerability and resilience in complex socio-ecological systems:*

Sustainability depends on building and maintaining the adaptive capacity needed to deal with the shocks, surprises and longer term structural transformations that are increasingly characterising our world. Existing understanding of adaptiveness, vulnerability and resilience has tended to adopt either nature- or society-oriented views of the world. What is needed are new concepts including the interaction of society and economy, value systems and power structures and their interaction with environmental systems and sustainability objectives.

➤ *sustainability in complex production-consumption systems:*

There have long been calls for deeper understanding of how the environmental impacts of production, on the one hand, and consumption, on the other, can be lowered. An important insight is that the greater need is for an integrated understanding of the relations between consumption and production (Lorek, Spangenberg 2001). Neither are consumers

driving the economy from the demand side, nor are businesses independent from them. Habits, attitudes and preferences of consumers and producers shape the global production chain, with sustainable development an explicit objective on either side. Unless quality of life and sustainable consumption cannot be reconciled, consumers will show reservations, and as long as sustainability provides no opportunities for more or more secure profits than unsustainable behaviour, business will remain opposed to the concept. Social and economic sciences must contribute as much as natural and technical sciences to the solution of these problems.

➤ *institutions for sustainable development:*

The systems of rules, procedures and orientations that guide social interactions shape both the challenges of, and the opportunities for, sustainability. Even anecdotal experience clearly demonstrates the limited ability of our institutions to deal with the long-term challenges, normative targets and the cross-scale aspects of sustainability. While education and capacity building will be essential bridge the knowledge gap between what we know and what we need to know, new transdisciplinary approaches will be necessary to generate the relevant knowledge. Monitoring systems regarding the sustainability performance of institutions and governance models are only in an embryonic state, and existing indicator systems tend to ignore core aspects of cultural diversity, power structures and in particular gender discrimination (Spangenberg 2002a). Gender mainstreaming in scientific staff and research topics offers a significant potential for enhancing the human knowledge base.

Not only the definition of innovative fields of research and development is a challenge to the established disci-

plines, but even more so the demands resulting from the necessary collaboration of scholars from different schools to solve problems of sustainable development. First of all, it means accepting the limitations to one discipline's contribution and the dependency on others. This leads to dealing with research questions formulated in other than the disciplinary language and thus probably out of reach for the established instruments. Consequently, for any school of thought integration into the sustainability framework means admitting limited competence, acknowledging the importance of heterodox schools of thought and questioning its own basic concepts and assumptions regarding their suitability in an extended framework. For different disciplines – here in alphabetical order – this has different implications; for instance:

- In *biology*, more attention should be devoted to the two-way interaction of humanity / society / economy and nature in systems evolution, and the development of capabilities like intelligence. Despite the importance of understanding genetic mechanisms, genetic determinism cannot explain the behaviour of higher level complex systems like individuals and ecosystems.
- For *chemistry*, not only the environmental impact of chemicals needs to be monitored and reduced, but substance development must go together with life cycle wide impact assessed including a limited mobility and durability of substances in line with the capacities of monitoring systems and the development of materials tailor-made for reuse, recovery and recycling.
- In *ecology*, the reaction of systems to increased levels of material and energy throughput required additional attention, and the perspective needs to be extended to include the role of governance models for effectively minimising the resulting damages.

- *Economics* needs to shake off the dominance of microeconomic thought – otherwise sustainability as a global and intergenerational normative concept cannot be accommodated. Sustainability needs concepts and S&T in the service of public sustainability goods like a healthy environment for future generations (i.e. an undiscounted future), human health, full employment, fair income distribution, education and workers rights. For this behalf, accounting must go beyond monetary accounting to include physical and social measures. As a multi-dimensional concept, sustainable development has no unambiguously defined optimum, as it is usual in economic theory when only two competing targets are taken into account. Instead, criteria must be defined to distinguish potentially sustainable from definitively unsustainable development trends. The research focus needs to shift from equilibrium models to understanding complex systems with multiple equilibria and unstable states. This would be supported by updating the perception of humans to the state of psychology and anthropology, including complex behaviour determined by social interaction as much as by individual utility maximisation.
- *Medicine* must devote a larger share of the research work to combating Third World diseases, but even more so to develop health promotion strategies based on the WHO's broad definition of health, including poverty eradication.
- *Political science* usually does not take note of the physical basis underlying nations, economies and trade patterns, nor does it deal sufficiently with the micro-level processes of defining interests and strategies in particular in the business sector, despite the extensive coverage of the resulting strategies and behaviour of institutional actors. Improved transparency and accountability of all actors, civil society empowerment, gender

equity and knowledge formation are sustainability objectives from Agenda 21 which still lack appropriate implementation strategies.

- For *sociology* the need to integrate the non-symbolic world of physical realities, their impacts on society and vice versa into the analysis is obvious, plus an intensified cooperation with political sciences, psychology and economics;

For all domains of science and engineering, sustainability science requires re-engineering of the fabric of science, its standard methodologies and institutions. However, if successfully implemented, this would significantly increase the value of science for society, enhance its credibility and provide a vast range of new and fascinating research questions. The challenge of sustainability is an opportunity not to be missed.

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PEACE AND SUSTAINABLE DEVELOPMENT WILL RISE OR FALL TOGETHER

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It is not likely that peace can be maintained in the longer term without sustainable development. Similarly, it is unlikely that sustainable development can take place in a climate dominated by war and the preparations for war.

In order to assess the prospects for both peace and sustainable development, we must take into account the broad global trends of our time: political, economic, military and cultural. I will attempt to provide some perspective on these trends.

Political

In the aftermath of the Cold War, there was a breakdown of the post World War II bipolar balance of power. The United States emerged as the dominant global power, while the Russians have struggled to maintain their economy and their influence. Instead of extending a gracious hand of support to the Russians, as

the United States did for Western Europe, including the vanquished nations, and Japan after WWII, the US has sought to extend its global reach and, in general, forced the Russians to accept compromising positions, such as the expansion of NATO into Eastern Europe.

At the same time, the United States has generally opposed the expansion of international law, including human rights law, and has withdrawn its support from many key treaty commitments, including the Anti-Ballistic Missile Treaty, the Comprehensive Test Ban Treaty, the International Criminal Court, the Kyoto Accords on Climate Change, and the Protocol to verify the Biological Weapons Convention. Almost daily there are reports of new US assaults on international law.

As the United States has sought to extend its power unilaterally, it has undermined the international political process established after World War II that operates through the United Nations. The US has withheld economic support from the United Nations and only sought to use it when the US perceived that its own interests could be directly advanced, as in the cases of the Persian Gulf War and the more recent US-led war on terrorism.

In the past, new coalitions have formed to provide a check on one country asserting global dominance. It is perhaps too early to see clearly the shape of a new coalition that might arise in response to US dominance, but if history is a guide there will be one. Even without any major coalition of forces arising, however, the US will remain challenged by terrorists seeking to avenge themselves against the US for policies that have adversely affected their lives, cultures and countries.

Economic

The US has promoted the forces of globalization that have opened the doors for capital to move freely to countries where the costs of labor are cheapest and the environmental regulations are most lax. Despite claims by Western leaders that benefits would accrue to the neediest, this “globalization from above” has continued to shift economic benefit from the poor to the wealthy, and has not provided substantial increased benefit to the poor of the world. Nearly half the world’s population continues to live in conditions of poverty, characterized by inadequate food, water, shelter and health care. These conditions create a fertile breeding ground for terrorists committed

to the destruction of US dominance and its imperial outreach.

Further, global military expenditures are approximately \$800 billion per year. These funds are largely used to repress and control the poor, when in actuality, for a small fraction of these global expenditures, the conditions of poverty could be largely eliminated. Of the \$800 billion spent worldwide on military forces, the US spends approximately one-half of the total. This trend has been on a steady rise since the Bush administration came into power.

The rich countries of the world have done little to alleviate the crushing burdens of poverty or to aid in redressing the indignities and inequities still existing after long periods of colonial rule. There is much cause for unease throughout the developing world, which is giving rise to continued low intensity warfare as exemplified by the Palestinian struggle against the Israelis and events such as the September 11th attacks against the United States.

Military

In the post-Cold War period, the US has pulled far ahead of the other nations of the world in terms of military dominance. The US is able to control NATO policy and has used NATO as a vehicle for its pursuit of military domination. In addition to dramatically increasing its military budget in recent years, the US has announced plans for high-tech developments that include missile defense systems, more usable nuclear weapons and the weaponization of space.

Despite its push for global military dominance, however, the nature of today's weapons limit the possibility of any country having unilateral dominance. Nuclear weapons, for example, are capable of destroying cities, and there is an increased likelihood in the aftermath of the Cold War that these weapons could fall into the hands of terrorists capable of attacking largely, if not completely, with impunity. Thus, the most powerful weapons that have

been created have greater utility for the weak (if they can get their hands on them) than they do for the strong (who may be reluctant to exercise such power and also unable to if they cannot identify and locate the source of the attack).

Cultural

The world is definitely experiencing a clash of cultures, but not along the fault lines of civilizations as Samuel Huntington has suggested. The opposing cultural trends that are most dominant are between those who define the world in terms of the value of massive accumulation and immediate use of resources (powerful individuals, corporations and the national governments that provide a haven for them) and those who define the world in terms of shared rights and responsibilities for life and future generations (most of the world's people). The former values, reflected predominantly by the economic elites in the United States and many other countries and constantly on display through various forms of media, do not promote sustainable development, wreak havoc on the poor of the world and invite retaliation. The latter values are reflected in the Universal Declaration of Human Rights and the growing body of international human rights law that has developed since World War II.

Dominant Trends

The dominant world trends today are:

- ❖ unilateralism by the United States and a downplaying of collective political responsibility;
- ❖ growing and increasingly desperate economic disparity between the world's rich and poor;
- ❖ a push for military dominance by the United States in particular and the Western states through NATO more generally, offset by the flexibility of terrorists who may obtain nuclear and other weapons of mass destruction; and

- ❖ the cultural dominance of greed and selfishness portrayed by global media on a broad screen for all, including the poor, to see from throughout the world.

These trends are destabilizing and unsustainable. They can change by democratic means from within democratic states or they can continue until the world is embroiled in conflagration. That is a choice that is available to us for a relatively short period of time as the trends are already quite advanced. The changes needed are:

- ❖ a shift to multilateralism, involving all states, through a reformed and strengthened United Nations;
- ❖ implementation of a plan to alleviate poverty and economic injustice throughout the world;
- ❖ a shift from US and NATO military dominance to the implementation of the post World War II vision of collective security; and
- ❖ a shift toward implementation of international law in which all states and their leaders are held to high standards of protecting human rights and the dignity of the individual.

The United Nations World Summit on Sustainable Development, set to take place in Johannesburg, South Africa in August 2002, will fail dramatically unless it takes into account these dominant trends and the need to shift them in more sustainable and peaceful directions.

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WATER AND SUSTAINABLE DEVELOPMENT

A viewpoint from a Ghanaian

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INTRODUCTION

My sister lives in Adenta, a suburb of Accra, the capital of Ghana. The distance between Adenta and central Accra is only about 20 km. Her house was built to have piped water flowing through taps, with sinks, water closets and showers in the appropriate rooms. When she moved there first, water was not available or accessible in the entire Adenta community and therefore, my sister's favourite greeting was "did you bring water?" The situation has improved somewhat; now water flows once a week, on Sundays! No one dares miss fetching water from the taps on Sundays and storing it for the rest of the week! During the period when water did not flow in her taps, she bought water from water vendors. They sold the precious liquid from large containers carried on make-shift carts pulled along the streets under conditions which made you wonder about the quality of the product sold at a price usually ten times what I was paying for, and from the comfort of my home and under better sanitary conditions.

My brother lives in Assin Kyekyer, a village in the Central Region. It is on the main road from Cape Coast, the capital of the Central Region, to Kumasi, the second largest city in Ghana and the regional capital of the Ashanti Region. It has no piped water and so when we go to visit, he advises us not to drink water, not even the rain water which he has harvested, until we got him a good water filter.

When I first moved from the university campus housing to my own house, I noticed what appeared to be a leak from the main pipe connecting water from the mains to my house. I not only called the attention of the meter reader to this when I met him in the house soon after I had moved in but queried him as to why he had not reported this to the tenant or those he was working for. I was amazed by his response; something to the effect that as long as the bills were paid everything was all right as far as he was concerned! When I had the leakage fixed and the water bill came to about half the usual charge for the house, I had someone from Ghana Water Company Limited come to the house to inspect the meter and my water bills. Apparently they thought I had done something illegal.

I am citing these personal experiences to illustrate only a few of the many problems confronting the water situation in Ghana, those of access, inadequate infrastructure and inefficiencies in the institutional arrangements for water supply. On July 16th 2002, one of the news items broadcasted was a faulty transformer at a water pumping station in the northern part of the country, resulting in an acute shortage of water in that part of the country. This is an indication of the continuous use of old pieces of equipment by the institution responsible for the distribution of water because it is poorly resourced.

The first Minister for Works and Housing in the present government became unpopular in some quarters because he had put an end to a situation where tanker drivers, who supply water to households without piped water, would fetch water from a reservoir built not as a source for

tanker drivers, but as a source to supply a number of communities, thus depriving residents in those communities from getting their regular supply of water. According to the tanker drivers, fetching water from the designated site which, to them, was too far would make their commodity too expensive. There were at least, two issues here: non-regulation of tanker drivers and water being more costly for those who do not have piped water (probably because they cannot afford to be connected).

KEY ISSUES IN THE WATER SECTOR

These are a few documentations of the problems associated with accessibility, affordability, availability, demand, supply and the quality of water in this country and probably other developing countries. Fortunately, the government of Ghana appears to be aware of the problem but the solutions seem to elude those expected to provide them. The government in a bid to improve efficiency, achieve sustainability and make water affordable to all consumers, decided to involve the private sector in the water sector. In order to achieve its objectives, a major restructuring of the then Ghana Water and Sewerage Corporation (GWSC), which was responsible for production and distribution of water, took place. GWSC was transformed into the Ghana Water Company Limited (GWCL), a Limited Liability Company owning the assets of the system for piped water. Its role was redefined to be more of an asset holder and monitor and less of producer and supplier as its predecessor was. An independent Water Sector Restructuring Secretariat was

established to oversee the restructuring and various studies were commissioned. Other organizations and institutions dealing with water include the Water Resources Commission, Public Utilities Regulatory Commission (PURC) and National Community Water and Sanitation Agency specifically for rural water supply.

In addition to accessibility, affordability, willingness to pay, demand and supply are key issues in the water sector because the amount of good quality water available is not adequate for the requirements of the populace. Water is life. It is a commodity that the people must have. Yet, according to one of the studies commissioned, on the average only 40% of the population has access to good water. This is the reason why water must be regarded as a developmental issue. If the people do not have ready access to it, they cannot contribute their share to the growth of the country. Availability, affordability, willingness to pay, demand and supply are all issues that need to be discussed and for which solutions must be found. Another issue that needs to be discussed is the status of women and children, the people who usually ensure that water is available in the household. These are the very vulnerable groups whose needs are hardly met because they tend not to be part of the decision making process. They are usually marginalized in developing issues and programmes, resulting in lower success rates.

Unfortunately, the cost of providing good quality water at all times is capital intensive and the people in developing countries seem not to have the resources to pay for the inputs needed so that the water companies can operate a viable venture. Part of the problem is that we tend not to participate in the research and development of products and technologies that affect our lives. When they have been developed, we want them or need to have them, and more often than not, we cannot afford to buy them. If the product is essential as water is, then we sit back and expect

that the government of the day will somehow get it for us without us making any contributions at all if possible. Worse still, we tend to abandon traditional technologies that we used, instead of trying to improve on them, even when we do not have the means to acquire new and perhaps better ones. Harvesting rain water within and outside the house was a common feature when I was growing up, but I see less of it now. I believe that it would be prudent to invest in architectural designs which will ensure such harvesting, especially with our knowledge of insufficient water resources for the entire population.

WATER AS A DEVELOPMENT ISSUE

Everyone seems to be aware of the importance of water in the socio-economic development of the country in terms of health and sanitation. Supply of the commodity is woefully inadequate in spite of the fact that it is a basic social need. According to one of the studies commissioned an estimated 50% of the population lack adequate water supply and it will cost approximately 25 billion US dollars to obtain 100% potable water coverage. Supply of potable water has not kept pace with demand for various reasons including

- population growth higher than economic growth,
- lack of capital needed for expansion,
- high cost of operations due to old age and poor maintenance of existing equipment,
- poor billing and collection of tariff,
- overstaffing and unacceptable percentage wastage at the GWCL.

These are some of the reasons why the problem with water is a hydra-headed one. The issues are social, economic, technological, and they require political will. If what is needed includes the increased capital expenditure to the tune referred to above, then it is obvious that the

government alone cannot supply the needed inputs; hence the government's decision on what has become known as the Private Sector Participation (PSP). There are views supporting as well as views opposing PSP. The concerns expressed are on responsibilities of government and the private sector with respect to asset ownership, operations and maintenance, capital investment and commercial risk. There is also the fear that the government will shirk its responsibility as a provider of a resource as vital as water with private participation.

In 2001/2002 one study commissioned by the PURC, the body responsible for price control, quality of service, product quality and accessibility of water for the urban sector, was on water accessibility, the purpose of which was to enable the PURC to develop policies for the protection of all water consumers in the urban areas, particularly the poor because of the planned introduction of PSP in the water sector. The study in the form of a survey was a large scale quantitative primary research to investigate water supply services from the perspective of the consumer, especially the poor. It is interesting to note that at a workshop to consider the outcome of the study, participants were asked to provide comments not only on the water and financial implications, but also on health. The inclusion of health in this assessment of water indicates the recognition of water as a development issue, because the health of the people affects development.

In July 2002, the PURC announced its approval of 40% increase in water tariff charged to consumers of piped water by the GWCL. The increase was to enable the Company to make the necessary improvements in the supply of water and to improve its cash flow. No increases were to be considered for two years but the increases due to inflation and to changes in exchange rates of the local currency were allowed. Since the announcements there has been hue and cry from different quarters

about the ability to pay and the insensitivity of the PURC to the plight of "the people." An increase in tariff was expected but the public is generally unhappy about the level of the increase announced. That there will be no increases approved by PURC for two years does not allay fears because increases due to inflation and exchange rates of local currencies are bound to come. Inflation is a world-wide problem and all governments try to reduce it and its impact. Exchange rate fluctuations affect economies of developing countries so much so that their impact tends to drive up the prices of almost all goods and services without any increases in incomes. Quality of life cannot improve under such circumstances. Unfortunately, improvements will only come if we can earn more by making products which can compete on the international markets. So even the cost of water, whether to the rich or poor, is tied to what we, as a nation can earn and that, in my opinion, will increase if we learn to add value to what we have. We cannot do that without enhancing the capacity of our people through education and research in locally relevant technologies. We need the help of our development partners to solve the local problems but we cannot exclude our own involvement as scientists and engineers and the involvement of the community.

Piped water is one of three avenues for the supply of water to households. The other two are through tanker services and small vendors. Only an average of approximately 40% of households gets piped water supplied through GWCL. Expansion is necessary because according to the PURC survey, people believe that piped water is of a better quality compared to the other sources of supply. The study as well as others also showed that getting connected to piped water was the most important issue for the majority of Ghanaians, more important than the cost. We must therefore make a special effort to get everyone connected. This will take a long time because the engineering feasibility could be a

constraint. Getting connected could also be a problem to consumers because for some people, the cost involved is prohibitive, while to some others, especially the poor, the location does not allow for a connection. It is also a problem from the point of view of the GWCL because the current income from billing does not cover the cost of production, let alone that of expansion. There is also a problem with the management of the existing load.

WATER FOR THE URBAN POOR

Then there is the problem of the urban poor who live in areas served by the piped network but do not get maximum benefit from the network because of poverty. In order to alleviate the plight of the urban poor who live in areas served with piped water, a 2-part rising block tariff is in place with a very low tariff for the minimum amount of water estimated to be required by an average person – the so-called life line tariff. Unfortunately, many believe that the benefits of such a "social tariff" are not enjoyed by the poor for whom it was instituted because they have no direct connection to the piped water. Rather, vendors, as middlemen, or landlords who have houses without meters for individual tenants or families living in a compound house, are the beneficiaries. Institutional arrangements to ensure that the poor benefit from this social tariff are needed. One that comes to mind is individual meters in shared houses. Unfortunately, meters are usually in short supply. Perhaps, the construction of standpipes in the neighbourhood, and not in the houses, coupled with water pre-payment systems, with the use of water tokens which the poor would buy whenever they have money, would help those who are paid daily wages or those with limited or irregular cash flow. In the various studies conducted, standpipes outside the houses were preferred to shared pipes in compound houses by the majority of the respondents who did not have individual meters.

Another suggestion which would benefit the poor would be a shared approach to managing the water supply as a community project. For example, a reservoir could be constructed, a pump purchased, and a tanker service contracted to supply this community at specified intervals. Water will be sold to cover cost and maintenance, and perhaps some savings for another project. Ownership of this asset, mode of bill collection, as well as contractual arrangements with the supplier of water would be clearly stated at the beginning of the project. The community, which knows itself and its members' characteristics, would be responsible for running the project.

CONCLUDING REMARKS

There is a general consensus that new capital investment is essential. However, opinions differ as to whether GWCL will deliver improved services once more capital had been injected into the water sector? It has been suggested that what is needed are innovative institutions for the improvement in water supply, which according to the studies was of high priority across social groupings. Flexibility in engineering design and standards may also be necessary.

While every effort is made to get as many people as possible connected to the mains, an equally serious effort should be made to supply good quality water to those who are not connected. Currently the suppliers to those who are not connected to the mains are tanker services and small vendors. These suppliers are interested in maximum profit. They are re-sellers of water mostly from the piped water network which is unavailable to consumers for one reason or another, usually the urban poor. Yet the cost of water to these consumers from this source is much higher and the quality generally poorer than the water from the piped network. These suppliers are not regulated in terms of cost and quality of their product as they ought to be.

In this short presentation I have tried to address accessibility of water supply, affordability of the cost of water, community involvement and

the government of Ghana's proposed solution with the involvement of the private sector. I have confined the presentation to domestic consumption of water because I am interested in human development issues. Quality of service and that of the product by the public and private service providers in and outside the piped network must be regulated and assured for an improved quality of life. The needs of the poor are no different from the needs of the non poor. The fact that the poor are prepared to pay a higher amount for the same product from the water vendors indicate their willingness to pay for this service as indicated in the various studies. Everyone is willing to pay for the quality service which now requires major investment. Financial capital comes to mind readily but I believe I have tried to indicate the importance of human and social capital also. Hopefully, in this era of perceiving things from a global perspective, all of us who are interested in development as an improvement in the quality of life would help to make life better by helping to provide good quality water to improve the health and status of the people.

ACKNOWLEDGEMENTS

I wish to express my sincere appreciation to Daniel N. Adom, Acting Executive Secretary of the Water Resources Commission and Emanuel Nkrumah, Water Engineer at the Water Sector Restructuring Secretariat for their readiness to assist me and the copies of reports of the various studies which they made available to me. Dr. Adom helped me to subscribe to an electronic LISTSERVER, which had an on-going e-conference on "*Toolkit for improved water supply and sanitation services among the urban poor.*" I am also grateful to Charles A. Biney, the Director of Water Research Institute of the Council for Scientific and Industrial Research who directed me to the two people mentioned above.

Open letter to the community of the University of California

I am writing on behalf of the International Network of Engineers and Scientists for Global Responsibility (INES), an association of over 90 organizations on five continents that works for the solution to environmental and social problems and the promotion of peace. As a former co-worker of the Lawrence Livermore National Laboratory who once lived on the edge of the Berkeley campus, I was always impressed by the academic level of the University, and the gentle spirits and open minds of students and teachers.

The University of California, however, has contributed to the research, testing and development of nuclear weapons for over 50 years. It has become clear that nuclear weapons destroy stability, increase uncertainty and aggravate the global imbalance. Every justification for academic support of developing nuclear weapons has lost its validity.

It has recently been revealed in the US Nuclear Posture Review that the United States is preparing new types of nuclear weaponry and does not exclude the use of nuclear weapons against non-nuclear weapon states in the future. It is impossible to understand why you are contributing to the development of these terrible weapons that politicians, without consulting you, may use for the destruction of our beautiful planet.

On behalf of the International Network of Engineers and Scientists for Global Responsibility, we urge the University of California to sever its relationship with the nuclear weapons laboratories and get out of the business of developing nuclear weapons. We urge scientists and engineers to act for the benefit of the world, using their abilities for solving international problems and for establishing a culture of peace.

Sincerely,
Prof. Armin Tenner, INES Chair

INES opposes US military intervention to achieve regime change in Iraq

Appeal to the international NGO community

Since summer 2001 the United States government has declared that it is considering a military intervention in Iraq, in order to overthrow Saddam Hussein to secure „regime change.“ The Iraqi people must have the right to choose freely the government they want and should not be forced to live under any kind of dictatorship, but the lack of self-determination does not justify foreign intervention. Therefore, is wrong for any country, including the USA, to try to use force to change the leadership of any other state. The last war against Iraq killed hundreds of thousands of people, caused immense environmental damage, human suffering of the ordinary Iraqi people and violated international law. Now President G. W. Bush threatens the same damage to the people of Iraq again, collecting or even deliberately constructing all kinds of arguments to justify the unjustifiable. Voices calling for new inspectors to re-establish the special inspection regime established by the United Nations Security Council had been raised long before September 11th, and as expected Iraq rejected these demands. However, when the country declared its readiness to participate in the more general inspection regimes of the Chemical Weapons Convention CWC and the Non Proliferation Treaty NPT, and when the Director of the CWC supported this move, he was replaced under US pressure, supposedly not to loose an argument for war. The NGO community should speak out loud against this politics and should pressurize their government not to join in but to keep the USA from going to war against Iraq.

WAR IS NO RESPONSE TO TERROR BUT TERRORISM ITSELF!

Press release

What is INES?

The International Network of Engineers and Scientists for Global Responsibility (INES) is an independent non-profit organization concerned about the impact of science and technology on society.

INES was founded in 1991. In 11 years, INES has become a network of over 90 scientific and engineer-member organisations in about 40 countries.

INES efforts focus on disarmament and international peace, ethics, justice und sustainable development.

INES promotes the following aims:

- ◆ to encourage and facilitate international communication among engineers and scientists seeking to promote international peace and working for an responsible use of science and technology.

This includes

- ◆ to work for the transfer of resources to the satisfaction of basic needs,
- ◆ to promote environmentally sound technology while taking long term effects into account
- ◆ to enhance the awareness of ethical principles among engineers und scientists
- ◆ to support those who have been victimized for acting such principles

INES is affiliated with the United Nations and with the UNESCO as Non-Governmental Organisation

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Research Project

SUSTAINABILITY AND PEACE

A CALL FOR PARTNERSHIP

In order to accomplish the objectives of an equitable and peaceful world and turn our production and consumption into the direction of sustainability, an intensive scientific research is needed. Research in the fields of the natural sciences, social and political sciences, economy and their interconnections. Research on general and global issues, equity and gender problems, but also on practical and often very specific and local problems of countries and regions, problems concerning agriculture, provision of water or conflict resolution. Many of the problems are lying in the South or in the connection between the North and the South. Scientific research must be centered on these problems and scientists from North and South must together participate in the, generally interdisciplinary investigation.

INES is a network of scientists and engineers, qualified in a variety of fields in the natural and social sciences and in economy. INES has member organizations over five continents. As individual members it has engaged researchers in Europe and the US and, in addition, in Africa, South America and Asia. They may be involved in common and interdisciplinary research projects. In order to employ this scientific potential and make it useful for the completion of the Johannesburg task, we decided to launch a research project on

Sustainability and Peace.

For a successful fulfilment of this proposition we must widen our scope and strengthen our base. We therefore make an appeal to NGOs and official organizations with similar intentions to support the effort by joining into a partnership. More humanpower would be available and additional expertise could come in. The partnership would result in a Type 2 collaboration, as it is named in the present language.

All organizations and individuals interested in the proposal may contact the INES office or the INES chairperson, Armin Tenner, q18@nikhef.nl.

ISIS-SGR-INES-TWN-Tebtebba Discussion Paper

Towards A Convention on Knowledge

By *Mae-Wan Ho, Eva Novotny, Philip Webber, E.E. Daniels* and others

Philip Webber, Vice Chair of SGR writes:

In the run-up to the World Summit on Sustainable Development (WSSD), Scientists for Global Responsibility (SGR) wants to help initiate a wide-ranging discussion on how science and knowledge should be developed and used. For the purpose, we are circulating this paper, originally drafted by Mae Wan Ho, which now reflects contributions from many sources and individuals.

We recognise that it will not be possible to reach a complete consensus on what a final document should say, but we welcome comments and suggestions.

We are asking people of all backgrounds and affiliations to express support for this draft Convention that also serves as a catalyst for linking up everyday lives and concerns with western science and indigenous knowledge.

Delegates in our networks attending the WSSD may find this document useful. After the WSSD, we hope that the draft Convention will continue to act as a touchstone for debate and discussion, to promote a world culture in which knowledge and its fruits are available to all.

The Complete Document is posted on the websites of ISIS, SGR and TWN Please e-mail us to express your support, or sign on at ISIS website.

www.i-sis.org.uk

www.sgr.org.uk

www.twinside.org.sg

Detailed Comments to:

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